



Natural Heritage & Endangered Species Program

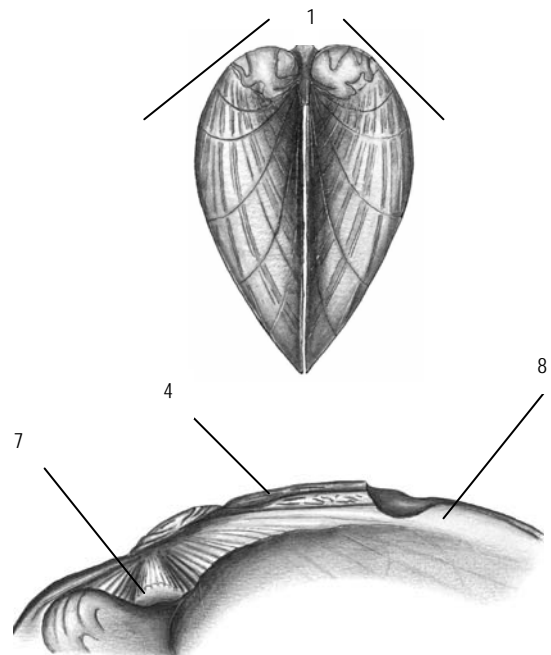
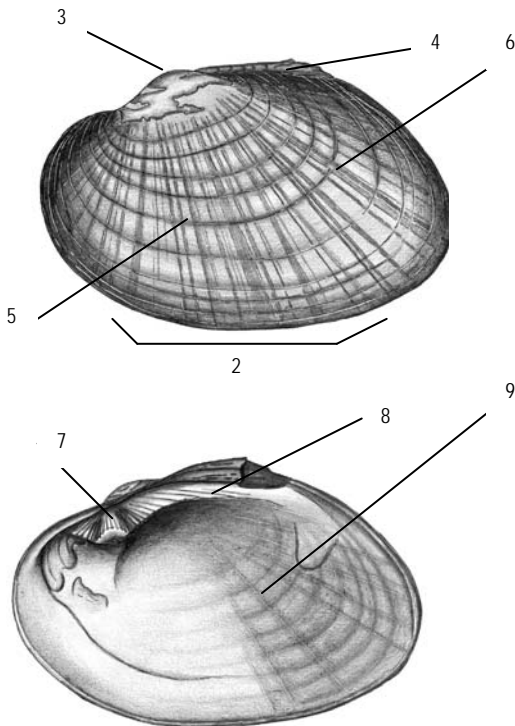
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Triangle Floater *Alasmidonta undulata*

State Status: **Species of Special Concern**
Federal Status: None

Description: The triangle floater is a small freshwater mussel that rarely exceeds three inches (75mm) in length. The shape is subovate to almost triangular and has a somewhat “squat” appearance (it is short, wide, and fat(1)). The ventral margin is rounded (2), so that the shell rocks evenly when placed on a flat surface. Beaks (3) are prominent and raised above the hinge line (4). Sculpturing on the beak is uneven and coarse, although this feature is more readily observed in young animals with little shell erosion. The periostracum (5) is smooth and shiny, and ranges in color from yellowish-green to nearly black. The periostracum has green shell rays (6) that are prominent on all but very old, stained, or eroded animals. Pseudocardinal teeth (7) are a triangular shape and very prominent; the pseudocardinal teeth are buttressed by a thick portion of the nacre. Lateral teeth are absent (8). The nacre (9) is distinctively bicolored: the posterior half of the shell is thin and an iridescent bluish-pink color, and the anterior half of the shell is substantially thicker and a white or pinkish color. The foot is usually white.

Similar Species in Massachusetts: The hinge teeth morphology, shell shape, and distinctly bicolored nacre make the shells (dead animals) of the triangle floater unmistakable from other species in Massachusetts. However, internal features cannot be used when identifying live animals. Live animals can often be confused with the brook floater, creeper, and dwarf wedgemussel. Greatest difficulty arises when trying to identify juveniles, animals with excessive shell erosion, or animals whose periostracum is darkly stained or covered with algae. The triangle floater is distinct from the brook floater because it lacks prominent ridges on the dorso-posterior slope and its ventral margin is curved rather than straight. In addition, triangle floater feet are white and brook floater feet are usually cantaloupe colored. Compared to the creeper, the triangle floater is more laterally inflated (1), has prominent beaks (3), and has a stronger shell. Young triangle floaters can be confused with dwarf wedgemussels that are more ovate than the typical wedge shape; usually the coarse uneven beak



Illustrations by Ethan Nedeau

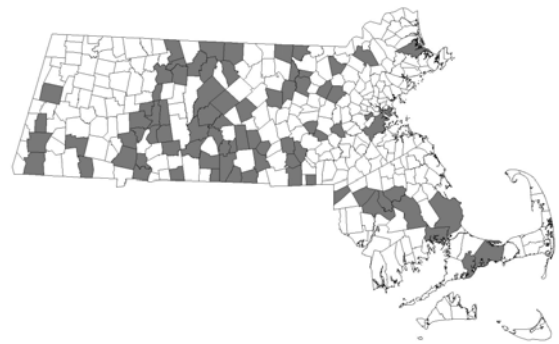
Text contributed by Ethan Nedeau, December 2007, Triangle Floater Fact Sheet.

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sculpture of the triangle floater and the size and shape of the animals will enable accurate identification. An expert should be consulted to identify the species because it is listed as a Species of Special Concern in Massachusetts and because it can be confused with three other state or federally protected species (brook floater, creeper, and dwarf wedgemussel).

Range: The North American range of the triangle floater extends from North Carolina northward to Nova Scotia and New Brunswick. It occurs in most Atlantic coastal drainages throughout that range. It also occurs in tributaries of the lower St. Lawrence River in Quebec. The triangle floater has the broadest range of any state-listed mussel in Massachusetts; it is present in 18 sub basins from the Housatonic River in western Massachusetts to coastal plain ponds of Cape Cod.

Habitat: In northeastern North America, the triangle floater inhabits small to large rivers and lakes. It is more commonly found in flowing water, where it occupies a wide range of substrate and flow conditions. Preferred habitats include low-gradient river reaches with sand and gravel substrates and low to moderate water velocities. It has been found in streams smaller than five meters wide and rivers wider than 100 meters. The triangle floater is the only species in the genus *Alasmidonta* that inhabits lakes; it occurs in both natural lakes and reservoirs occasionally in Massachusetts and in Maine, although at lower population densities than in rivers. Its ability to tolerate standing water makes this species less sensitive to the effects of dams than other species, such as the brook floater. In fact, at times it is as abundant in small impoundments of run-of-river dams as it is in free-flowing portions of rivers. Like most other mussel species, triangle floaters are sparse or absent in headwater streams and high-gradient river reaches. Because they are widespread in Massachusetts and inhabit a wide range of habitats, they share habitat with almost every other mussel species.



Distribution in Massachusetts
1982-2007
Based on records in Natural Heritage Database

However, they are most abundant in rivers that support eastern elliptio, eastern lampmussel, creeper, brook floater, and dwarf wedgemussel.

Biology: Freshwater mussels are essentially sedentary filter feeders that spend most of their lives anchored to the bottoms of rivers, streams, lakes, and ponds by their muscular foot. Gills circulate water through their shells via incurrent and excurrent openings, siphoning nutrients to be absorbed by the digestive system. This filtering process is also critical for successful reproduction (Figure 1). Like all freshwater mussels, larvae (called glochidia) of the triangle floater must attach to the gills or fins of a vertebrate host (mainly fish) to develop into juveniles (for a review, see Nedeau *et al.* 2000). This parasitic phase is the only period during which mussels can disperse long distances. Fertilization occurs in the summer and glochidia are released the following spring. Studies have identified several hosts that are common in coldwater and warmwater environments in Massachusetts, such as the common shiner, blacknose dace, longnose dace, white sucker, pumpkinseed sunfish, fallfish, largemouth bass, slimy sculpin, and several species not found in the state

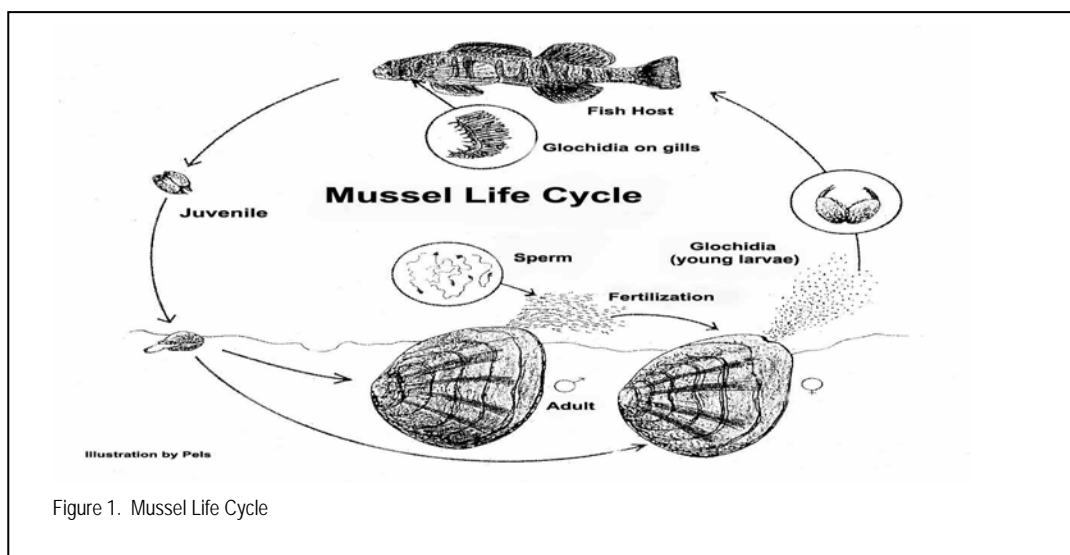


Figure 1. Mussel Life Cycle

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(Nedeau *et al.* 2000, Wicklow 2004). The triangle floater uses a broader variety of host fish than the closely related dwarf wedgemussel. Following the parasitic period, juveniles drop to the bottom of the lake or river, burrow into the sediment, and spend the rest of their lives as free-living animals. Longevity is unknown, but given their size and the longevity of closely related species (dwarf wedgemussel and brook floater), the triangle floater likely lives for eight to 20 years in Massachusetts. During that time, they may only move a few meters within a water body.

Population Status in Massachusetts: As of October 2007, there were 92 recent occurrences (<25 years old) of the triangle floater in 18 sub basins and 79 towns in Massachusetts. Of the 92 recent occurrences, 76 consisted of live animals (versus dead animals) and only 31 of these were comprised of ten or more individuals. Data acquired from recent surveys indicate that the triangle floater is widely distributed in Massachusetts, however, many populations are sparse and recruitment status is unknown. The long-term viability of low-density populations is poorly understood, therefore, the triangle floater is listed as a Species of Special Concern in Massachusetts pursuant to the Massachusetts Endangered Species Act (MG.L. c.131A) and its implementing regulations (321 CMR 10.00). The triangle floater is faring well in other New England states and is not listed as state-protected; Maine removed it from their list of Special Concern Species in 2006 after a careful status review. The triangle floater is one of three species in Rhode Island, along with eastern elliptio and eastern floater, considered widespread (Raithel and Hartenstine 2006). A careful status review is needed to assess the long-term viability of triangle floater populations in Massachusetts.

Threats: Because triangle floaters are essentially sedentary filter feeders, they are unable to flee from degraded environments and are vulnerable to the anthropogenic alterations of waterways. Some of the many threats to the triangle floater and its habitat in Massachusetts include: nutrient enrichment, sedimentation, point-source pollution, alteration of natural flow regimes, water withdrawal, encroachment of river corridors by development, non-native and invasive species, habitat fragmentation caused by dams and road-stream crossings, and a legacy of land use that has greatly altered the natural dynamics of river corridors. In addition, the long-term effects of regional or global problems such as acidic precipitation, mercury, and climate change are considered severe but little empirical data relates these stressors to mussel populations. As local populations of triangle floaters decline and/or become extirpated in response to these threats, dispersal distances between populations increase, weakening overall reproductive success, and ultimately genetic diversity (Vaughn 1993).

Conservation & Management Recommendations:

Discovery and protection of viable mussel populations is essential for the long-term conservation of freshwater mussels. Currently, much of the available mussel occurrence data are the result of limited presence/absence surveys conducted at road crossings or other easily accessed points of entry. In addition, regulatory protection under MESA only applies to rare species occurrences that are less than twenty-five years old. Surveys are critically needed to monitor known populations, evaluate habitat, locate new populations, and assess population viability at various spatial scales (e.g., river, watershed, state) so that conservation and restoration efforts, as well as regulatory protection, can be effectively targeted. The NHESP has produced the *Freshwater Mussel Habitat Assessment and Survey Guidelines* and maintains a list of experts qualified to conduct surveys. Other conservation and management recommendations include:

- Maintain naturally variable river flow and limit water withdrawals
- Identify, mitigate, or eliminate sources of pollution to rivers
- Identify dispersal barriers (e.g., dams, impassable culverts) for host fish, especially those that fragment the species range within a river or watershed, and seek options to improve fish passage or remove the barrier
- Maintain adequate vegetated riparian buffers
- Protect or acquire land at high priority sites

Further Reading

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- Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. *The Freshwater Mussels of Maine*. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine.
- Raithel, C.J., and R.H. Hartenstine. 2006. The Status of Freshwater Mussels in Rhode Island. *Northeastern Naturalist* 13(1): 103-116.
- Vaughn, C. 1993. Can biogeographic models be used to predict the persistence of mussel populations in rivers? pp.117-122 in K.S Cummings, A.C. Buchanan and L.M. Koch (eds.), *Conservation and Management of Freshwater Mussels: proceedings of a UMRCC symposium, 12-14 October 1992, St. Louis, Missouri. Upper Mississippi River Cons. Com., Rock Island, Illinois.* 189 pp.

Updated: 12/01/07

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